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ABSTRACT

To determine whether preschool education benefits middle-class elementary school children, a study was conducted which compared the social, motor, and academic progress of kindergarten and elementary school children who had attended a Montessori preschool, another kind of preschool, or no preschool. The sample was chosen according to age, attendance at preschool, and social class. A total of 201 middle-class children between the ages of 64 and 128 months participated in the study. Of those children participating 151 had attended a nursery, day care, or private school prior to entry into kindergarten for 3 or more days a week, for either half or full days. Each of the three groups of subjects contained five age levels roughly corresponding to kindergarten through fourth grade levels. The Developmental Profile II, given in the form of a parent interview, and parent and teacher questionnaires were used to obtain background information and data on children's abilities. The profile indicated the child's development in months on physical, self-help, social, academic, and communication scales. Generally, results indicated that middle-class children in the primary grades, regardless of preschool background, seem to function at the same level. Results and implications are discussed, conclusions are offered, and graphs and tables of data are included in the report. (RH)

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A Comparative Study of the Effects of Preschool Education on Middle Class Children

Prepared by Employees of the Puce Area Development Project

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July 1982

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INTRODUCTION

The following study by the Puce Area Development Project was funded by a Canada Community Development Project 1981/1982 grant under the auspices of Employment and Immigration Canada. The project was sponsered by Lakeview Montessori School and is a comparative study of middle class children between the ages of five and nine with 1) Montessori preschool background, 2) nursery/day care background, and 3) no preschool background.

In recent years, preschool education has become a major concern to educators and parents for many reasons. One is the increasing participation of women as full time members of the work force. Another is the realization that the years from birth to age six are important to the development of physical and intellectual skills which establish patterns for future growth. During the past twenty years, beginning with Project Head Start in 1965, educators have turned their attention to early intervention programs as a means of providing economically disadvantaged children with an opportunity to enter the educational system with the same basic skills as middle class children. Experimental preschool programs have shown that early intervention does make a positive difference to the performance of disadvantaged children in the areas of social competence,

creativity, curiosity, motor impulse control, academic achievement, school readiness, language development, and IQ development (Sciarra & Dorsey, 1974; Chatiin-McNichols, 1981; Provost, 1980; Moore, 1978). Not only does early intervention affect the disadvantaged child positively in the aforementioned areas but it also results in fewer grade repeaters and fewer placements in special education classes (Brown, 1978).

Particular interest has been directed towards the type of preschool program and the advantages and disadvantages of varying theories of education. The Montessori method is one such theory. Perhaps this method is popular because it was originally developed for ghetto children in Rome at the turn of the 20th Century. In several educational studies, disadvantaged children exposed to a Montessori preschool program as opposed to traditional preschools were found to be more proficient in perceptual/conceptual tasks, task persistence, cognitive development and conventional learning processes (Berger, 1969; Banta, 1966).

Studies which favour early intervention when dealing with children from low income families are numerous, however, research dealing with middle class children in a preschool setting is very limited and outdated. Studies which have been conducted seem to suggest that the enriched middle class environment outweighs any advances that may occur as a result of preschool, regardless of the type of preschool (Miezitis, 1971; Chatiin-McNichols,1981). This study will attempt to determine whether or not preschool

education benefits middle class elementary children in the 80's.

Several Montessori preschools, nurseries, and day care centres were visited at the beginning of the project. Materials used, flow of information, peer group relationships, and teacher/child relationships were observed and recorded (Table 1, Preschool Program Observation Checklist; Table II, Preschool Program Checklist).

Chart I - Summary of Observations *

	Montessori	Preschool	Day Care Centres
Materials Used	self-correcting, learning materials; eg: Pink Tower, geometric puzzles	self-correcting, learning materials, play equipment; eg: Pink Tower, doll house, puzzles	play equipment; eg: dolls, toys play kitchen
Flow of Information	environment to child	environment to child, teacher to child	teacher to child
Peer Group Relationships	interaction not encouraged during classroom time	interaction encouraged within limits set by teacher	unlimited interaction but not to point of disrupting others
Teacher/Child Relationships	teacher observes activities and assists when asked	teacher becomes directly involved in activities	teacher supervises activities

* This summary is based solely on the observations of this research team and should not be considered universal since each environment is unique.

The preschool teachers were asked to state the three main goals of their programs and explain how these goals were implemented (Table III, Preschool Teacher Questionnaire). These goals were examined and the three most prominent goals of each of the different types of preschools were combined and summarized.

Chart II - Summary of Goals of Preschools

	Montessori	Preschool	Day Care Centre
Goal # 1	encourage & develop independence and strong self identity	meet individual social, physical, emotional, intellectual needs of child	help child develop good self-image
Goal # 2	instill a love of learning for its own sake	encourage child's independence	create warm, home-like environment
Goal # 3	provide experiences which coincide with sensitive periods of development (eg. sense of order, shape, colour)	respect child as individual	meet individual social, physical, emotional, intellectual needs of child

These observations, in conjunction with information found in research documents, led us to formulate the following hypotheses:

Hypotheses

1. Children with Montessori preschool, aged five to nine, will score higher than children with other preschool experience and non-preschoolers in the areas of academic and motor development as measured by the Developmental Profile II.[1]
2. Children with other preschool experiences, aged five to nine, will score higher than children with Montessori preschool experience and non-preschoolers in the area of social development as measured by the Developmental Profile II
3. Children with either Montessori preschool or other preschool, presently aged five to nine, will score higher than non-preschoolers in all areas as measured by the Developmental Profile II.

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[1] Alpern, Boll & Shearer, Developmental Profile II (Revised Edition, 1980)

METHOD

Sample

The sample was chosen according to 1) age, 2) attendance at preschool, and 3) social class. Children falling between the ages of 64-128 months as of January 1, 1982, were eligible to participate in the study. Attendance at a nursery, day care or private school prior to entry into kindergarten for a minimum of one year, three or more days a week, for either half or full day was a prerequisite for inclusion in the study. Only middle class children were used in the study, therefore, participants were selected on the basis of their residential location. All preschoolers included in the sample had attended preschools located in residential, suburban areas. Non-preschoolers were also residents of suburban, middle class areas.

Parental occupation and education levels of all the sample children were noted but this data was not a valid measure of social class since family income was not available to the project. The information did, however, reveal an interesting trend reflecting the parents' occupation and their choice of preschool (Table IV, Occupational Classification Chart; Table V, Educational Level Classification Chart).

The sample was obtained using the following methods:

1. Class lists - 39%
2. Word of mouth contact - 33%

3. Response from flyers and advertisements - 17%
4. Birth announcements found in The Windsor Star - 10%

Class lists, which consisted of name of child, home address and phone number, were supplied by participating preschools. Parents were then called at random and asked if they wished to participate in the study. Advertisements were placed in three local newspapers, The Windsor Star, The Saint, and The Lance asking for interested parties. Flyers explaining the project were sent home via school children in two Essex County Separate Schools. The remainder of the sample was obtained through word of mouth contact by participating parents and persons directly involved in the study.

Of approximately 300 parents initially contacted, 275 (92%) indicated interest and agreed to take part in the study. Parent questionnaires were sent out to these parents and 221 (80%) were completed and returned. From this number, twenty-three children were eliminated for the following reasons:

1. insufficient preschool background, eg. only one day/week for a few months
2. exceptionalities such as emotional disturbances or learning disabilities
3. inappropriate age

This brought the number of usuable parent questionnaires to 198. A total of 201 interviews, using the Developmental Profile II, were completed. The discrepancy between the number of returned parent questionnaires and the number of interviews completed lies in the fact that three siblings of sample children, who met the

sample description, were present at the time of the parent interview and, therefore, were included in the study. The Profile was completed for these three children but the parent questionnaires were not returned.

During the interview, parents were given teacher questionnaires which they examined and signed before sending them to school via the children. Of the 201 teacher questionnaires sent out, 123 (61%) were completed and returned.

The sample was broken into three divisions; Montessori, Preschool, and Non-Preschoolers, each containing five age levels: Group One (64-76 mos.), Group Two (77-89 mos.), Group Three (90-102 mos.), Group Four (103-115 mos.), and Group Five (116-128 mos.). These age groups roughly correspond to kindergarten, grade one, grade two, grade three and grade four. The age groups were determined by using the youngest age in the sample (64 mos.) as the base and constructing five groups at twelve month intervals ending at 128 months.

Out of the total sample (201), 60 of the children had Montessori preschool background. In the Montessori division, 58.3% of the children had attended preschool for five days per week, half day, and 31.6% had attended for five full days a week. The majority of the Montessori children had attended preschool for at least two (38%) and three (23%) years.

Of the total sample, 91 children had attended some form of preschool other than Montessori. Most children (41%) attended

half day programmes for three days a week, while 20% attended half day programmes for five days a week. Only 10% of the preschoolers attended full day programmes for five days a week. The majority of the Preschool children (43%) had attended preschool for one year, while 39% had attended for two years.

The total sample also included fifty children who had no preschool background - 25% of the total sample.

Chart III - Percentage of Children Attending Preschool

	Number of Days Per Week				
	1	2	3	4	5
Montessori (60)					
Half Day Programme	0	1.6	6.6	0	58.3
Full Day Programme	0	0	1.6	0	31.6
Preschool (91)					
Half Day Programme	0	8.8	41.1	2.2	20.0
Full Day Programme	1.1	5.5	5.5	5.5	10.0

	Number of Years of Preschool							
	1	1½	2	2½	3	3½	4	NA
Montessori (60)	21.7	6.7	38.3	1.7	23.3	1.7	3.3	3.3
Preschool (91)	43.9	6.6	39.6	3.3	6.6	0	0	0

Procedure

In order to prove or disprove our hypotheses, data was needed on the children's social, motor and academic progress in their present school situations. Due to the limited duration of the study, six months, tests which would measure the children's ability directly were considered impracticable because of admini-

stration time. Lack of participation on the part of local school boards made it impossible to administer group tests, consequently, the Developmental Profile II was selected as being the most appropriate method of determing the ability of the children used in the study.

The Profile was administered in the form of a parent interview and took approximately twenty minutes to complete. Upon completion, the Profile gave the child's development, in months, on five separate scales: physical, self-help, social, academic, and communication. These scores were then compared with the child's chronological age. This comparison determined how advanced or delayed the child was on each of the five scales.

Parent and teacher questionnaires were developed to collect general information on social, motor and academic skills as well as 1) parents' occupation, 2) parents' education level, 3) full or half day programme attendance, and 4) reasons for choosing the particular preschool (Table VI, Parent Questionnaire, Table VII, Teacher Questionnaire). Information pertaining to the number of years attended preschool was obtained during the interview.

RESULTS

An analysis of variance performed on the Profile scores within each of the five age levels revealed that there were no significant differences between Montessori preschoolers (M), Preschoolers (P), and Non-Preschoolers (NP). The level of probability for all tests was 0,05 (Graph 1, Dev.Profile-Group I, Graph II, Dev.Profile-Group 2, Graph III, Dev.Profile-Group 3, Graph IV, Dev.Profile-Group 4, Graph V, Dev.Profile-Group 5).

There were also no significant differences found between M, P, and NP scores on combined age levels in each of the five Profile scales.

Chart IV - Group Means - Developmental Profile II

	Montessori	Preschool	Non-Preschool
Physical	102.2 mos.	103.2 mos.	103.9 mos.
Self-Help	99.4 mos.	101.0 mos.	101.5 mos.
Social	96.4 mos.	99.1 mos.	97.1 mos.
Academic	95.8 mos.	95.5 mos.	97.2 mos.
Communication	105.5 mos.	104.6 mos.	103.5 mos.

An analysis of the parent questionnaires revealed that the parents of M rated their children slightly higher on mean social scores than did the parents of P and NP. The teacher questionnaires revealed that the teachers of M rated their pupils lower on mean social, motor skills and academic scores than did the teachers of P and NP.

Chart V - Group Means - Parent Questionnaires

	Montessori	Preschool	Non-Preschool
Social	78.3%	77.4%	76.2%
Motor Skills	85.0%	84.2%	85.4%
Academic	84.6%	84.6%	83.8%

Chart VI - Group Means - Teacher Questionnaires

	Montessori	Preschool	Non-Preschool
Social	71.2%	77.1%	75.8%
Motor Skills	77.6%	85.3%	85.2%
Academic	74.3%	80.2%	80.3%

An examination of parental occupations revealed that 53% of the Montessori fathers and 39% of the Montessori mothers were categorized in professional and technical occupations; 15% of the M fathers were in managerial positions and 14% of M mothers were clerical workers. The rest of M parents were divided amongst the other categories. Out of the Preschool sample, 25% of the fathers and 28% of the mothers were categorized as professional and technical; 20% of the P fathers were categorized as craftsmen; 18% of P fathers were classified as holding managerial positions and 12% of P mothers were classified as clerical workers. The remaining parents were divided amongst the other categories. Of the Non-Preschool sample, 29% of the fathers were classified as craftsmen; 22% of the NP fathers and 22% of NP mothers were classified as professional and technical people; 15% of the NP mothers were clerical workers and 10% of NP fathers were classified as labourers. (Table IV)

An examination of parental education levels revealed that 32% of Montessori mothers had some form of post high school training; 32% of M fathers and 27% of M mothers had university degrees; and 25% of M fathers had post university degrees. Of the Preschool sample, 16% of the fathers and 13% of the mothers had partially completed high school; 32% of the mothers and 25% of the fathers had completed high school; 26% of P mothers and 21% of P fathers had some post high school training; 21% of P fathers and 15% of P mothers graduated from university; and 10% of P fathers had post university education. Of the Non-Preschool sample, 15% of the fathers had partial high school education; 38% of the NP fathers and 25% of the NP mothers had graduated from high school; 25% of NP fathers and 22% of NP mothers had some form of post high school training; 15% of NP mothers had partial university education; and 15% of NP fathers and 18% of NP mothers were university graduates. (Table V)

Of a sample of 151 preschoolers (M & P), 39% of the parents chose the preschool because of its proximity to home, 58% of the parents chose the preschool because of its reputation; and 3% chose the preschool because of cost and transportation reasons.

Of the Montessori sample, 23% of the parents chose the school because of proximity; 75% chose the Montessori school because of reputation and theory; and 2% chose the Montessori school because transportation was provided.

Of the Preschool sample, 50% of the parents selected the preschool because of its proximity to home; 46% chose it because

of reputation; and 3% selected the preschool because of cost and transportation reasons.

CONCLUSIONS

The academic and motor scores of the Montessori sample on the Developmental Profile II do not support Hypothesis #1, that children with Montessori preschool, aged five to nine, will score higher than children with other preschool experience and non-preschoolers in the areas of academic and motor development as measured by the Developmental Profile II.

The social scores of the Preschool sample on the Developmental Profile II do not support Hypothesis #2, that children with other preschool experiences, aged five to nine, will score higher than children with Montessori preschool experience and non-preschoolers in the area of social development as measured by the Developmental Profile II.

The scores of the Montessori and Preschool samples on the Developmental Profile II do not support Hypothesis #3, that children with either Montessori preschool or other preschool, presently aged five to nine, will score higher than non-preschoolers in all areas as measured by the Developmental Profile II.

DISCUSSION

The absence of differences between the scores of Montessori preschoolers, Preschoolers, and Non-Preschoolers seem to suggest that when dealing with the middle class child, the enriched home environment is more influential than the type of preschool. This can be supported by the finding that Non-Preschoolers scored just as high as Preschoolers and Montessori preschoolers on the Developmental Profile II. It must be noted, however, that the Profile scores of children in age group five are not true measures of their ability since their chronological ages usually exceeded 114 months which was the maximum age measurable on the Profile. Because the test was administered in the home, distractions such as the presence of young children, phone calls, etc., might have affected the validity of parent responses.

The parent/teacher questionnaires were limited because without school board co-operation, specific test results and data regarding social behaviour and motor skills were not available to the study. Consequently, the social, motor, and academic scores of the children on the questionnaires are, at best, estimates and cannot be considered true measures of their ability. However, these scores are valid in that they indicate the majority of parents viewed their children's performance in school much the same as the teachers. Montessori parents were the only exception as they rated

their children higher than the teachers did. This difference might be attributed to the fact that 75% of M parents chose the Montessori preschool because of its philosophy. This trend could be indicative of a "self-fulfilling prophecy" effect, wherein the parents rated their children highly due to their belief that the Montessori system of education offers a better form of preschool.

The majority of all parents chose their children's preschool because of the type of programme offered, which suggests parents believe differences do exist between preschools. If this is so, then parents must also feel that different preschool environments produce different results and the type of preschool does affect the development of their children.

The length of time spent in preschool appears to be of no consequence to the performance of the middle class child as measured by the Developmental Profile II. The Montessori preschoolers who had attended preschool for the greatest number of years did not score significantly higher (on the social, motor and academic scales of the Profile) than the Preschoolers or Non-Preschoolers. This may be due to the fact that the educational system assumes all children entering kindergarten must be taught the same basic skills regardless of individual ability. Advanced children are held at the same learning pace as their peers with no academic skills. This might tend to retard any advances children (with preschool background) may have had at the beginning of the school year.

The fact that a higher percentage of Montessori parents were

professionals, as compared to the parents of Preschoolers and Non-Preschoolers suggests that the original focus of the Montessori method has been inverted. The system, which was originally designed to meet the needs of the disadvantaged child has now become the preferred method of preschool education for the economically advantaged. Parental answers on the questionnaires, however, indicated that cost was not a significant factor in determining the type of preschool selected.

IMPLICATIONS

Although the results of this study indicate that preschool education does not enhance the social, motor and academic development of middle class children, other research should be conducted in order to determine if indeed the enriched home environment is the reason for this. If the home environment outweighs any advantages incurred by preschool when dealing with the middle class child, perhaps teachers of preschool programmes should investigate this further in order to determine whether or not their programmes are functioning at the maximum level of efficiency.

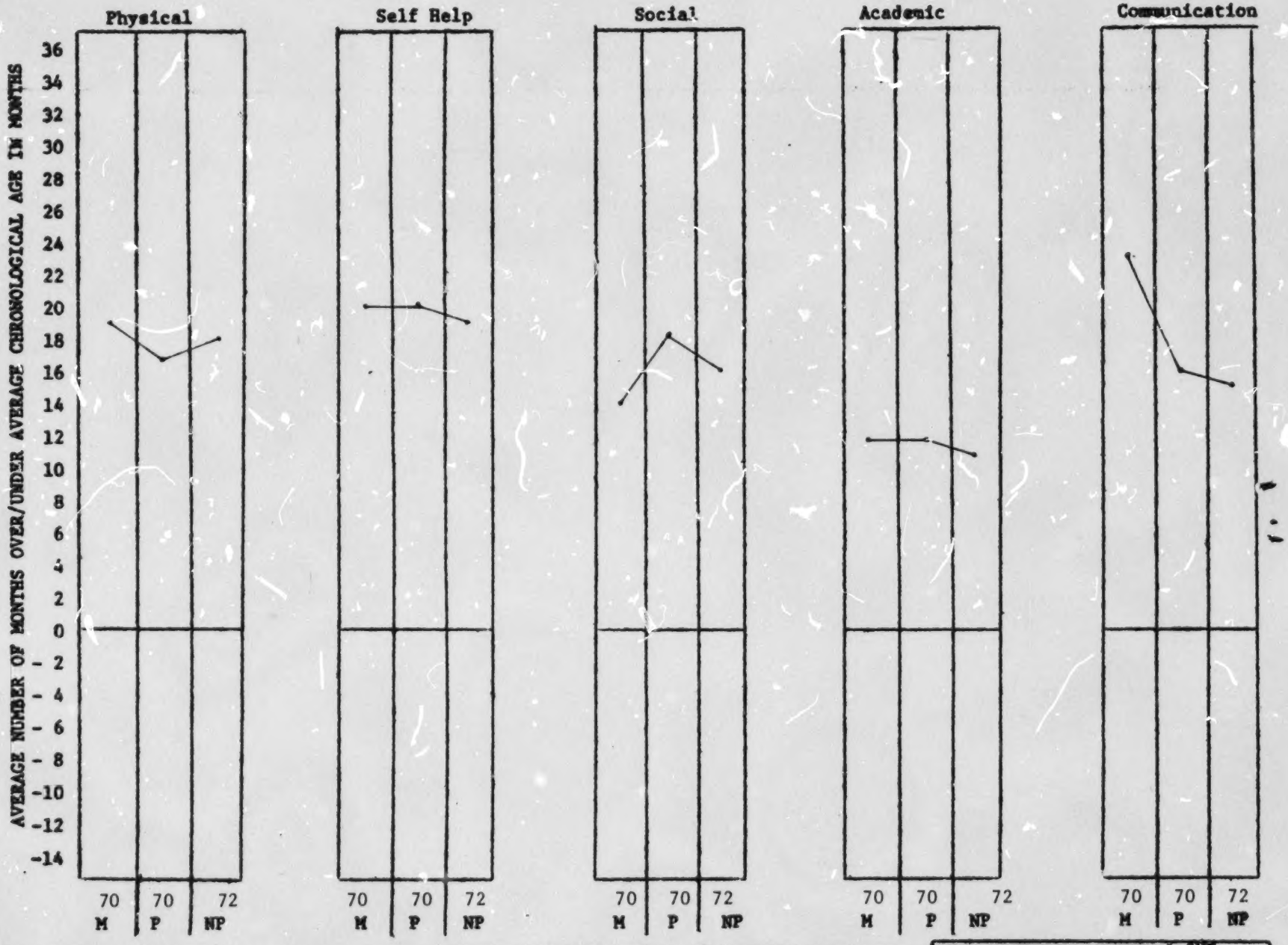
Other interesting questions raised by this study are: Is preschool necessary for the middle class child? If yes, should preschools be standardized and have common goals so each child enters kindergarten with the same basic skills thus eliminating redundancy in primary grades?

Parents, as indicated by their reasons for selecting preschool, obviously believe that preschool does benefit their children. If there is no noticeable difference between the performance of preschoolers and non-preschoolers, might this be attributed to what happens to the children upon their entry into kindergarten? Further studies are needed which would investigate teacher relationships with preschoolers and non-preschoolers in the primary grades. Are children, who are entering kindergarten with the basics, being taught what they have already learned at home or in preschool? Does the primary curriculum challenge and stimulate the child who has attended preschool for three years and is ready to learn new materials, or is the primary curriculum so regulated that all children are taught at the same level, regardless of their ability?

This study has found that middle class children, in the primary grades, regardless of preschool background, seem to function at the same level. However, it is possible that benefits of preschool education may not be noticeable until the later elementary grades or even high school. Thus, longitudinal studies following the development of middle class preschoolers into high school must also be conducted before any definitive conclusions can be drawn as to the importance or unimportance of preschool to the middle class child in the 80's.

GRAPHS

Graph I	Dev. Profile - Group 1
Graph II	Dev. Profile - Group 2
Graph III	Dev. Profile - Group 3
Graph IV	Dev. Profile - Group 4
Graph V	Dev. Profile - Group 5
Graph VI	Parent/Teacher Questionnaire Scores - Social Scale
Graph VII	Parent/Teacher Questionnaire Scores - Motor Scale
Graph VIII	Parent/Teacher Questionnaire Scores - Academic Scale


Physical
Self Help
Social
Academic
Communication
AVERAGE NUMBER OF MONTHS OVER/UNDER AVERAGE CHRONOLOGICAL AGE IN MONTHS
36
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- 2
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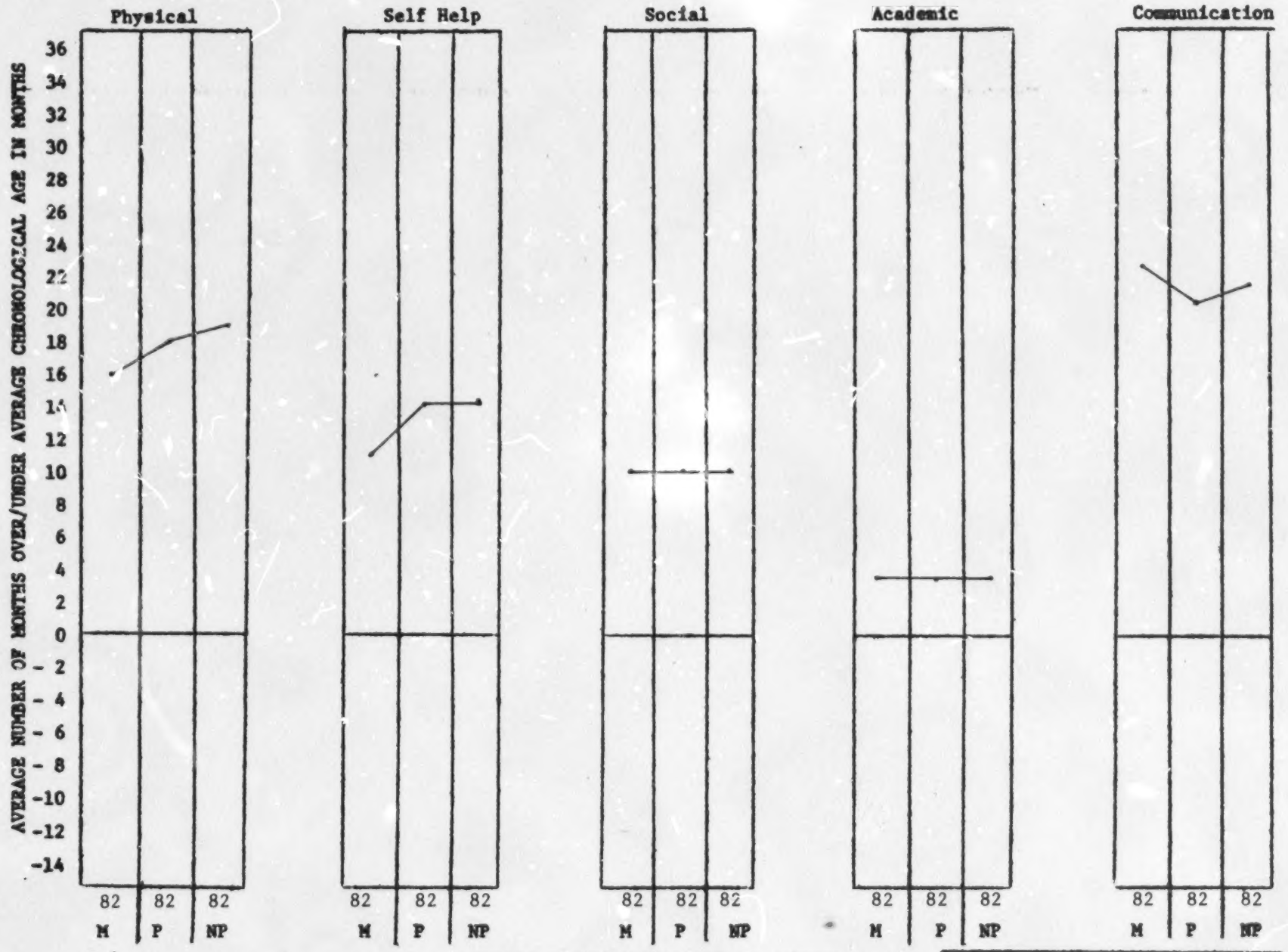
70 M
70 P
72 NP
AVERAGE CHRONOLOGICAL AGE IN MONTHS
DEV. PROFILE - GROUP # ONE


Physical
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AVERAGE NUMBER OF MONTHS OVER/UNDER AVERAGE CHRONOLOGICAL AGE IN MONTHS
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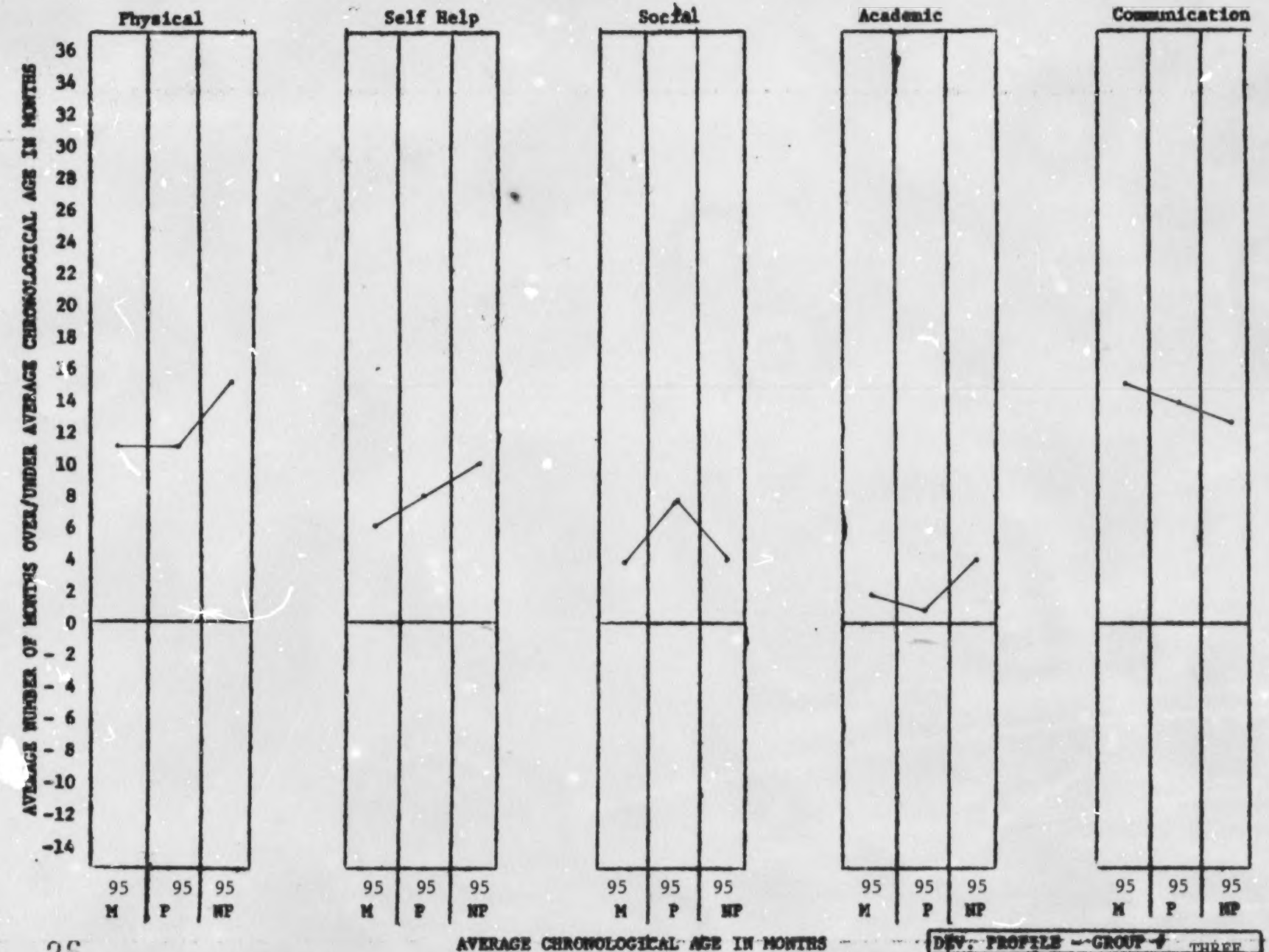
82 82 82
M P NP
AVERAGE CHRONOLOGICAL AGE IN MONTHS
DEV. PROFILE - GROUP # TWO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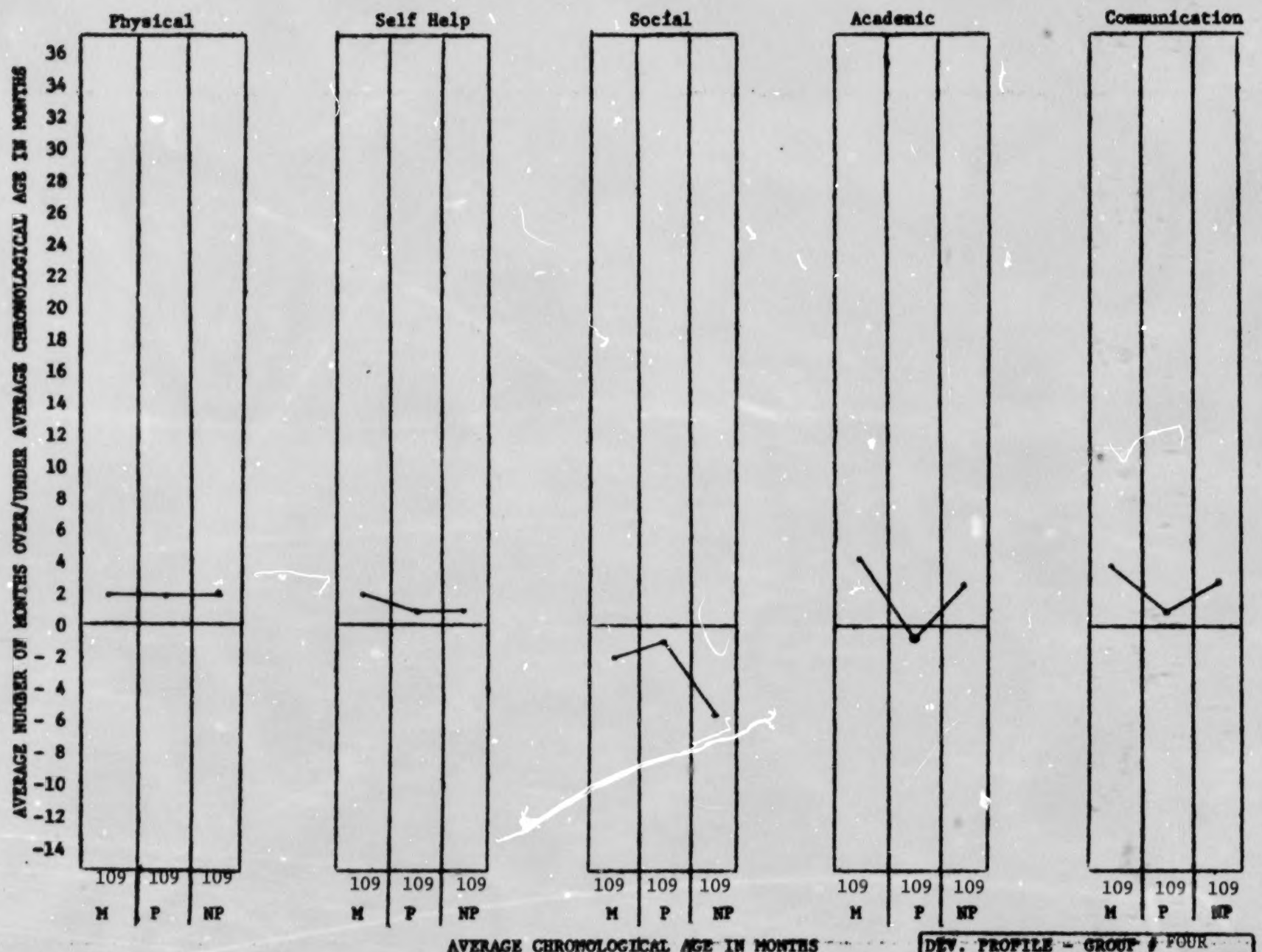
NP
AVERAGE CHRONOLOGICAL AGE IN MONTHS
DEV. PROFILE — GROUP — THREE


Physical
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AVERAGE NUMBER OF MONTHS OVER/UNDER AVERAGE CHRONOLOGICAL AGE IN MONTHS
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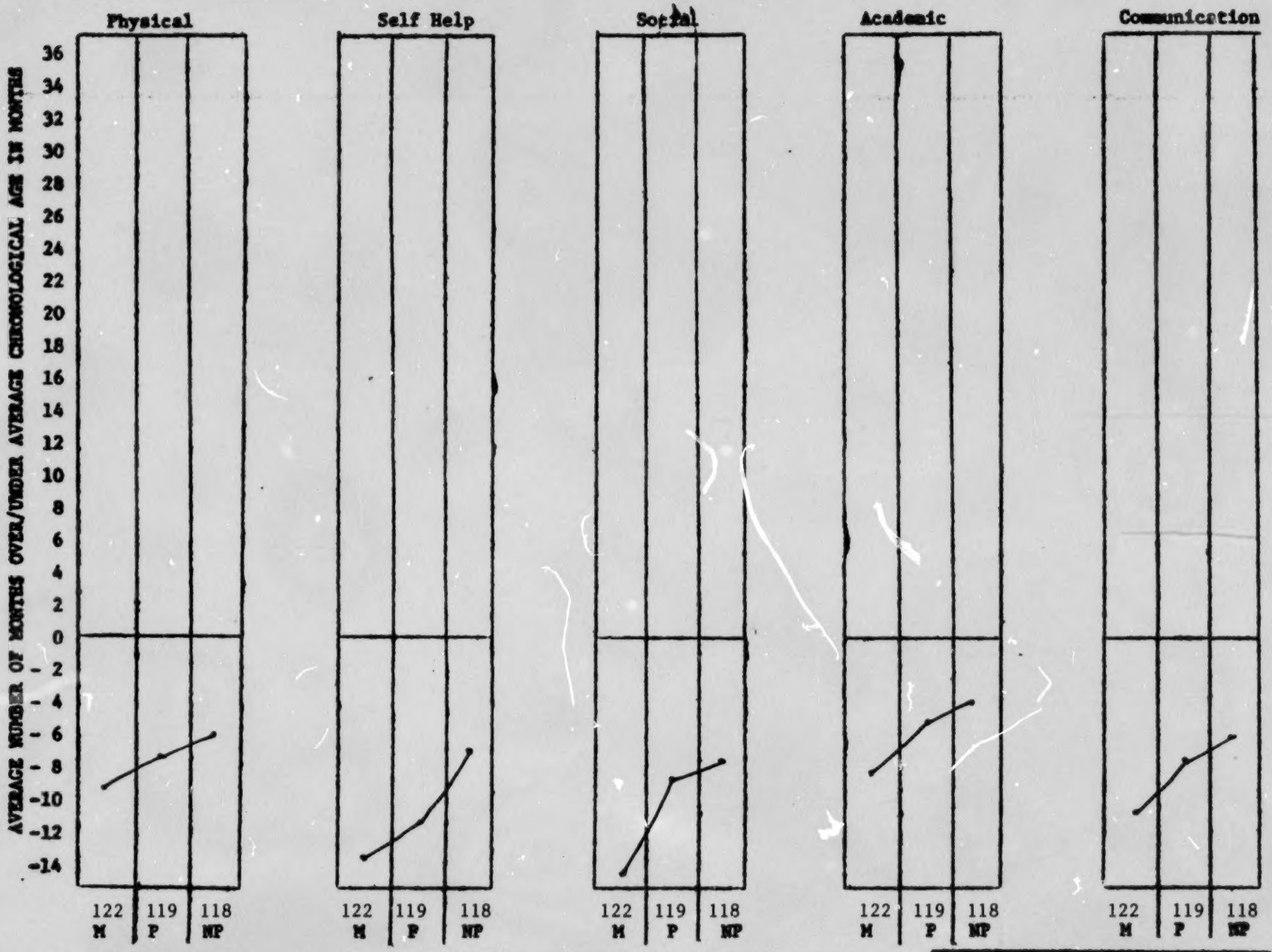
AVERAGE CHRONOLOGICAL AGE IN MONTHS
DEV. PROFILE - GROUP # FOUR


Physical
Self Help
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Academic
Communication
AVERAGE NUMBER OF MONTHS OVER/UNDER AVERAGE CHRONOLOGICAL AGE IN MONTHS
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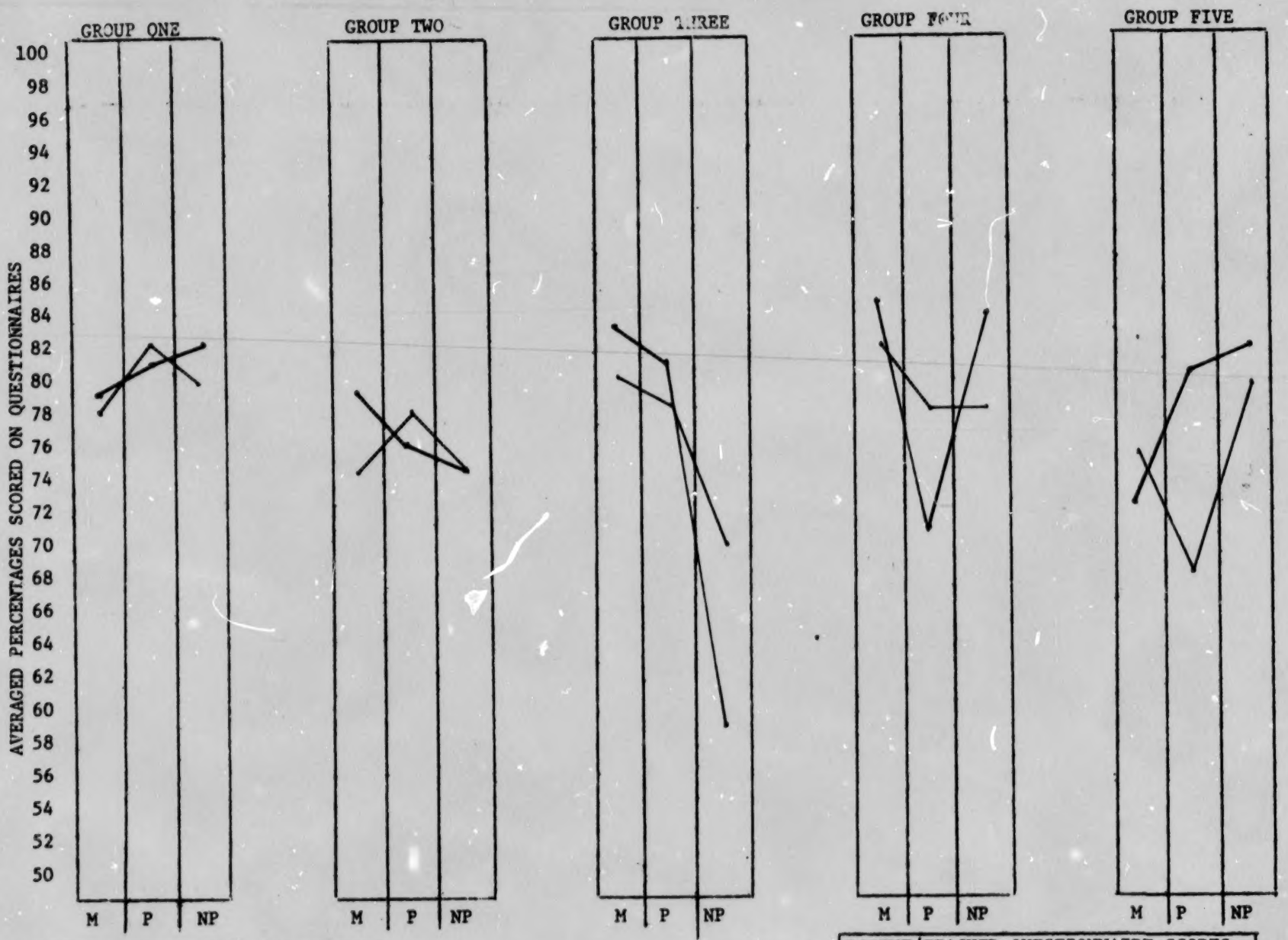
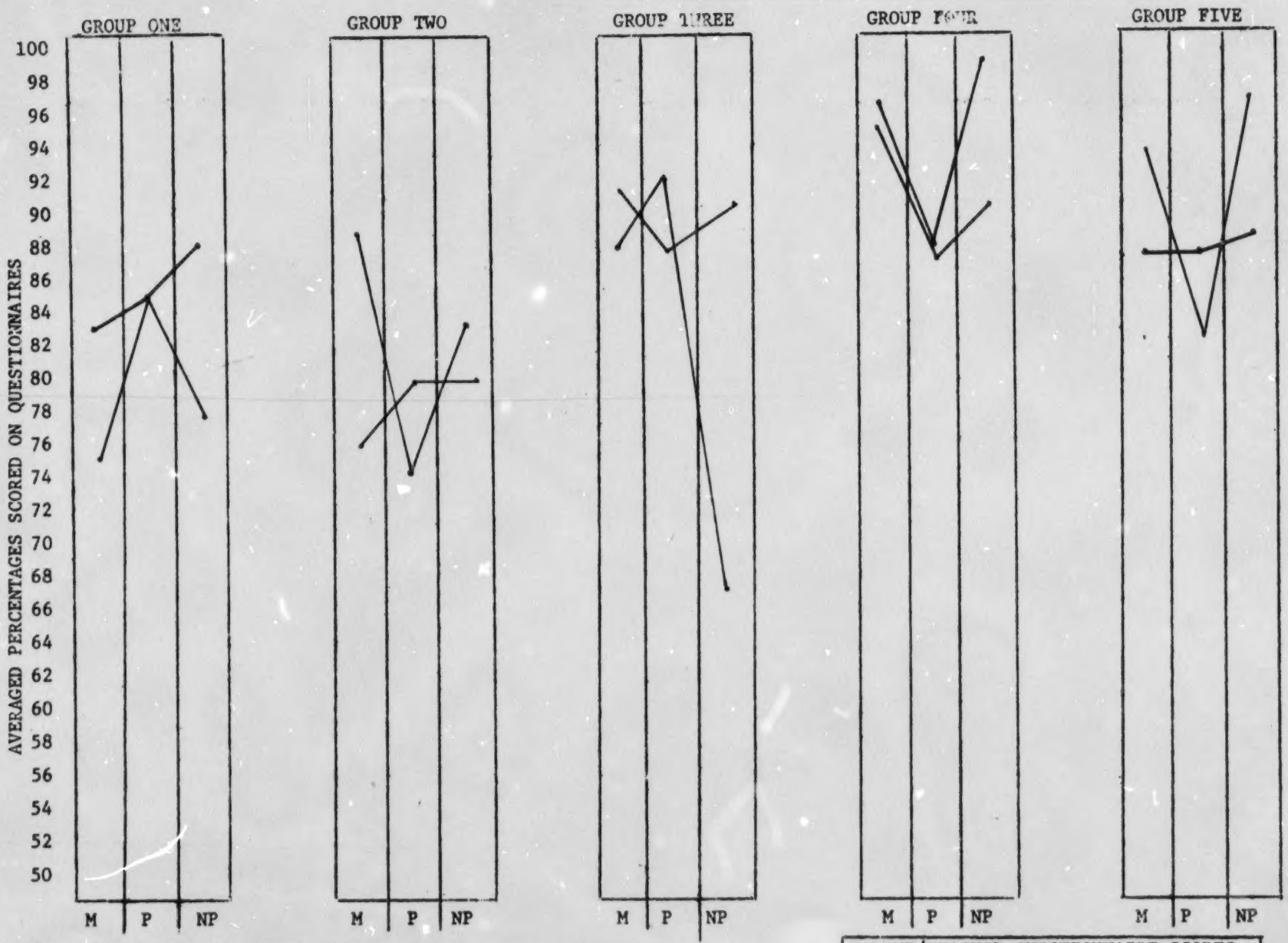
118
NP
AVERAGE CHRONOLOGICAL AGE IN MONTHS
DEV. PROFILE — GROUP — FIVE



PARENT/TEACHER QUESTIONNAIRE SCORES
SOCIAL SCALE


GROUP ONE
GROUP TWO
GROUP THREE
GROUP FOUR
GROUP FIVE
AVERAGED PERCENTAGES SCORED ON QUESTIONNAIRES
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74
72
70
68
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M
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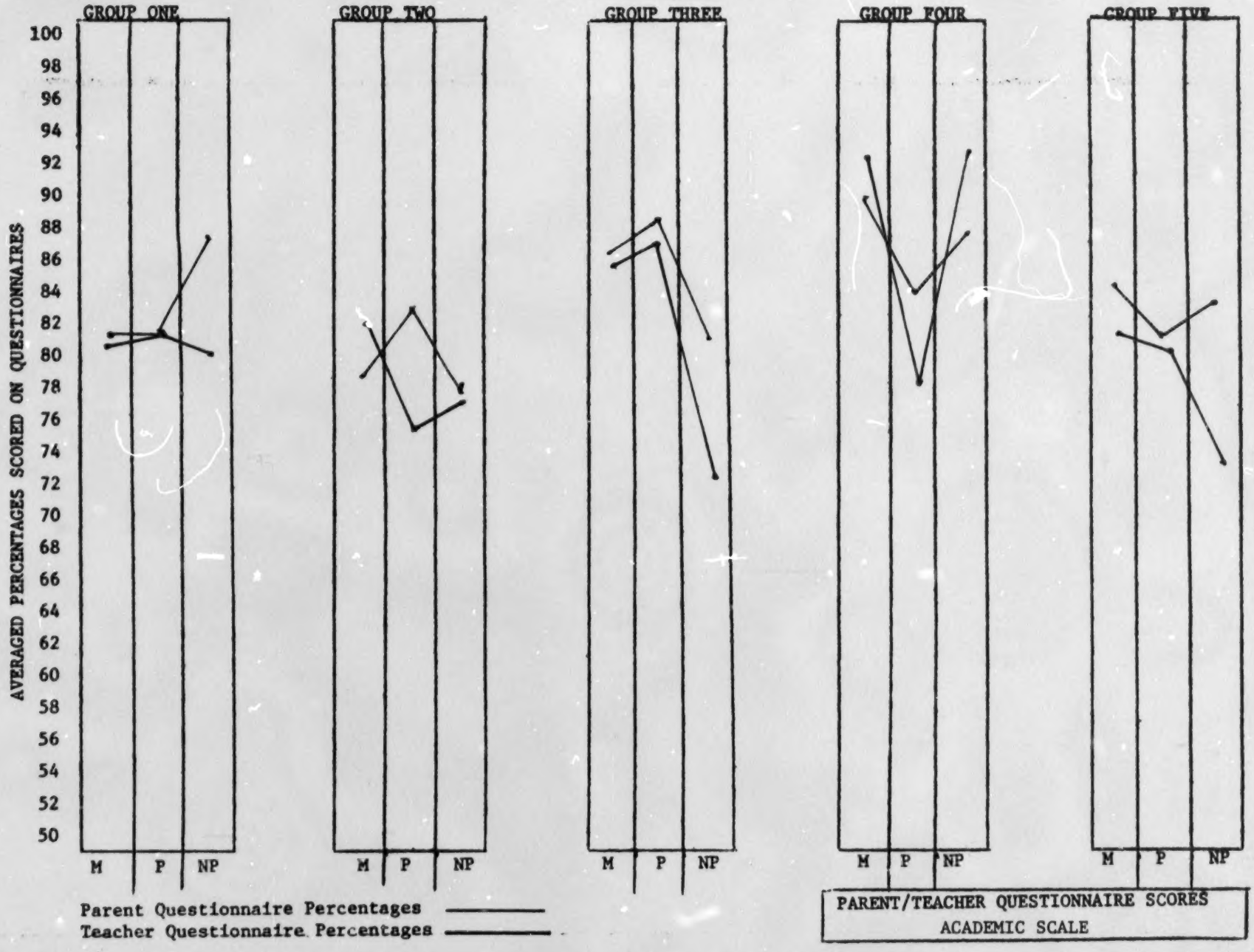
NP
Parent Questionnaire Percentages
Teacher Questionnaire Percentages
PARENT/TEACHER QUESTIONNAIRE SCORES
MOTOR SKILLS SCALE


GROUP ONE
GROUP TWO
GROUP THREE
GROUP FOUR
GROUP FIVE
AVERAGED PERCENTAGES SCORED ON QUESTIONNAIRES
100
98
96
94
92
90
88
86
84
82
80
78
76
74
72
70
68
66
64
62
60
58
56
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M
P
NP
Parent Questionnaire Percentages
Teacher Questionnaire Percentages
PARENT/TEACHER QUESTIONNAIRE SCORES
ACADEMIC SCALE

TABLES

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II	Preschool Program Checklist
III	Preschool Teacher Questionnaire
IV	Occupational Classification Chart
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PRESCHOOL PROGRAM OBSERVATION CHECKLIST

TABLE I

Name of School:

Date of Observation:

Type of Program Observed:

Number of Children: Age Levels: Pupil/Teacher Ratio:

Work Requirements:

Presentation of Material:

Materials Used:

Freedom of Movement:

Flow of Information:

Schedule:

Types of Activities:

Peer Group Relationships:

Teacher/Pupil Relationship:

Additional Comments:

PRESCHOOL TEACHER QUESTIONNAIRE

TABLE III

Name of School:

Date school established: Number of teachers employed:

Number of children enrolled in preschool program:

List the 3 major goals of your preschool program in order of importance:

Summarize briefly how these goals are implemented:

How many teachers are certified in E.C.E., Montessori, other?

Has the philosophy or methodology of your program undergone any major changes since it was established? State briefly the changes and when they were instituted:

Are children evaluated upon or during their time at preschool? Yes No

What form of evaluation is implemented, i.e. names of tests used?

Are follow-up procedures instituted when children leave your program? Yes No

Specify the nature of the follow-up procedures, ie. formal written reports or informal verbal reports?

Is you program equipped to handle the needs of children with physical handicaps or emotional problems?

If special programs are available, please use back of questionnaire to describe these programs.

PRESCHOOL PROGRAM CHECKLIST *

TABLE II

Observer to circle answer that is most representative of preschool program being observed.

1. Work Requirements

   A. certain work requirements must be completed in a set period of time
   B. the child determines his own usage of time; there are not deadlines set
   C. the child's time is his own but purposeful activity is encouraged by the set up of the environment

2. Presentation of New Material

   A. teacher initiates work rather that the child
   B. there are many child directed activities and few teacher directed activities
   C. the child chooses his own work, according to his interests and abilities within the scope of the material offered by the teacher

3. Freedom of Movement

   A. freedom of movement is limited
   B. child is allowed to move about at will
   C. freedom of movement is allowed within the framework of clearly defined ground rules so that the child knows what is expected of him

4. Ability Level

   A. teacher determines the ability of groups of children in classroom
   B. groupings of children occur spontaneously among all levels of ability
   C. groupings are spontaneous but are limited by the ability level required to perform the task

5. Flow of Information

   A. flow of information is from teacher to student
   B. flow of information regularly comes from the environment, child-to-child interaction and teacher-to-child interaction
   C. flow of information is from the environment (learning stems from the use of the materials), teacher-to-child and child-tochild interaction when necessary

6. Schedule

   A. there are scheduled times for different activities
   B. there are no regularly scheduled times for different activities
   C. there are no regularly scheduled times for activities, however, there are certain times when special activities are available

7. Attitude Towards Academics

   A. academics are a primary goal
   B. academics per se is not a goal; the goal of education is to help the child adapt to the world and build confidence in himself; emphasis is on fostering emotional growth and well being
   C. academics is a secondary goal; the primary goals are those relating to the whole child and his functioning in the classroom, such as work habits and social and emotional development

*Blakemore, Butler, McGuire, "After Montessori: The First Grade", Children's House (Late Fall Pre/Hol. Issue, 1974): 18-20.

OCCUPATIONAL CLASSIFICATION CHART *

TABLE IV

Based on response on Parent Questionnaire

Category		Percentage of Montessori Population	Percentage of Preschool Population	Percentage of Non-preschool Population	Percentage of Total Population
Managerial	Father	15	18	7	14
	Mother	2	3	2	2
Professional & Technical	Father	53	25	22	31
	Mother	39	28	22	29
Clerical	Father	2	3	4	3
	Mother	14	12	15	13
Sales	Father	5	4	7	5
	Mother	5	5	0	4
Service & Recreation	Father	5	8	7	7
	Mother	2	4	2	3
Transport & Communication	Father	2	5	2	3
	Mother	0	1	0	< 1
Farmers & Farm Workers	Father	0	2	0	< 1
	Mother	0	0	0	0
Craftsmen & Production	Father	8	20	29	19
	Mother	2	0	0	< 1
Labourers	Father	3	7	16	8
	Mother	0	0	0	0
Not Stated	Father	7	8	5	7
	Mother	37	47	60	48

*See Occupational Classification Manual, Census of Canada, 1961
Hon.George Hees, Minister of Trade and Commerce
Roger Duhamel, Printer, FRSC, Queen's Printer and Controller of Stationary

EDUCATIONAL LEVEL CLASSIFICATION CHART

TABLE V

Based on response on Parent Questionnaire

Category		Percentage of Montessori Population	Percentage of Preschool Population	Percentage of Non-preschool Population	Percentage of Total Population
Completed Grade Eight	Father	0	1	4	1
	Mother	0	0	0	0
Partial High School	Father	2	16	15	12
	Mother	2	13	7	8
Graduated High School	Father	12	25	25	21
	Mother	24	32	38	31
Post High School *	Father	15	21	25	21
	Mother	32	26	22	27
Partial University	Father	7	5	2	5
	Mother	5	11	15	10
Graduated University	Father	32	21	15	22
	Mother	27	15	18	19
Post-graduate Studies	Father	25	10	7	14
	Mother	7	3	0	3
Not Stated	Father	7	1	7	4
	Mother	3	0	0	< 1

*Includes Trade School, Community College, Apprenticeships, Specialized Training

PARENT QUESTIONNAIRE — Puce Area Development Project — TABLE VI

Child's Name _____ Age _____ Sex _____

Father's Name _____ Mother's Name _____

Occupation _____ Occupation _____

Education completed to _____ Education completed to _____

Other children in family (give ages and sex) _____

Did your child attend preschool?_____ Where? _____

Why did you choose this particular preschool?_____

Estimate the number of days in any given month that your child did not attend school other than holidays, P.D.Days, school closings._____

PART ONE

Using the following rating scale, estimate the number of times in a given week that your child exhibits the following behaviours:

1	2	3	4	5	6
never	less than once a week	once a week	twice a week	three time a week	daily

1. Works by himself, eg. reading, homework, etc. 123456
2. Complains about his appearance, eg."not pretty enough","not smart enough." 123456
3. Needs help in certain tasks involving co-ordination, eg.tying, pencil work.123456
4. Leaves chores uncompleted. 123456
5. Displays indications of an active curiosity, eg. asks detailed questions, takes things apart to see how they work, etc. 123456
6. Spends free time engaging in creative activity, eg. drawing, painting, etc.123456
7. Disobeys orders 123456
8. Has trouble getting along with children his own age, including siblings. 123456
9. Gets actively involved in physical sports. 123456
10. Expresses an unwillingness to carry out difficult tasks. 123456
11. Likes to be "leader" when playing with friends. 123456

PART TWO

Using the following rating scale, candidly evaluate the level of your child's performance in the following academic areas:

1	2	3	4	5	6
not applicable	very poor	poor	average	good	very good

1. Mathematics 123456
2. Language Skills 123456
3. Reading 123456
4. Creative Writing 123456
5. Social Studies(history,geography) 123456
6. Science 123456
7. Music 123456
8. Physical Education 123456
9. Art 123456

Present School _____ Teacher's Name _____

TEACHER QUESTIONNAIRE — Puce Area Development Project TABLE VII

Student's Name _____ Grade _____

Teacher's Name _____ School _____

PART ONE

Using the following rating scale, estimate the number of times in a given week that the above student exhibits the following behaviours:

1	2	3	4	5	6
never	less than once a week	once a week	twice a week	three times a week	daily

1. Displays difficulty in tasks independent of teacher supervision. 123456
2. Uses phrases and adjectives indicating a good self-concept, ie"pretty", "smart", etc. 123456
3. Requires additional assistance in gaining expertise in the areas of fine motor skills, ie. cutting, pencil work, tying shoe laces. 123456
4. Does not finish assignment during given time. 123456
5. Asks lesson related questions, ie. requires information other than what is necessary to the lesson. 123456
6. Spends free time engaging in overt creative activities, ie. artwork,etc. 123456
7. Willingness to co-operate with teacher. 123456
8. Co-operates willingly with other children in group work activities. 123456
9. Requires additional assistance in gaining expertise in the gross motor skills areas, ie. sports, playground activities, etc. 123456
10. Expresses an unwillingness to try difficult tasks. 123456
11. Assumes position of leader whenever possible. 123456

PART TWO

Using the following rating scale, indicate the level of the child's achievement in the following academic areas:

1	2	3	4	5	6
not applicable	very poor	poor	average	good	very good

1. Mathematics 123456
2. Language Skills 123456
3. Reading 123456
4. Creative Writing 123456
5. Social Studies (history,Geography) 123456
6. Science 123456
7. Music 123456
8. Physical Education 123456
9. Art 123456

PARENTAL PERMISSION

I hereby grant permission for the above named teacher to release the information requested on this questionnaire concerning my child.

Child's Name _____ Parent's Signature _____

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RAW DATA - DEVELOPMENTAL PROFILE

TABLE VIII

GROUP ONE - 64-76 mos. Total Sample = 37 df = 2/34 Critical Value = 3.28 at 0.05 level of probability

Montessori-sample = 14					Preschool-sample = 12					Non-Preschool-sample = 11				
P	SH	S	A	C	P	SH	S	A	C	P	SH	S	A	C
100	94	84	78	66	98	102	86	78	90	92	94	92	86	80
74	94	94	86	88	66	90	78	74	62	98	86	100	86	94
88	86	79	82	106	94	98	94	78	90	102	102	84	82	82
86	94	74	78	98	96	94	84	86	94	102	110	100	86	102
94	102	100	92	110	96	86	100	92	102	92	98	82	78	98
98	78	92	82	98	70	78	84	78	94	86	86	90	82	86
96	96	100	78	98	102	94	90	82	98	70	86	90	86	66
88	94	86	86	94	98	90	92	82	93	78	74	74	78	78
98	82	68	82	92	80	82	92	86	80	88	82	78	82	96
96	114	90	86	90	86	90	86	82	66	80	86	84	92	86
84	89	89	82	94	84	82	86	82	70	106	98	90	78	90
84	82	72	74	88	70	98	90	78	94					
76	86	74	82	66										
90	72	74	82	110										
1252	1263	1176	1150	1298	1040	1084	1062	978	1033	994	1002	964	916	958

P - F = .380 not significant
SH- F = .029 not significant
S - F = 1.015 not significant
A - F = .439 not significant
C - F = 1.061 not significant

TABLE XII

GROUP FIVE - 116-128 mos. Total Sample = 19 df = 2/16 Critical Value = 3.[illegible] at 0.05 level of probability

Montessori-sample = 6					Preschool-sample = 8					Non-Preschool-sample = 5				
P	SH	S	A	C	P	SH	S	A	C	P	SH	S	A	C
114	110	104	114	102	102	110	110	114	110	106	102	108	114	106
110	114	108	114	110	110	114	114	114	110	114	114	110	114	114
114	98	100	114	110	114	102	104	114	110	114	114	114	114	114
114	110	114	114	114	114	106	114	114	110	114	110	106	114	114
114	106	108	114	114	114	106	104	114	114	114	114	114	114	106
114	114	114	114	114	114	110	114	114	114					
					110	102	108	114	106					
					114	114	114	114	114					
680	652	648	684	664	892	864	882	912	888	562	554	552	570	554

P - F = .486 not significant
SH- F = .441 not significant
S - F = .512 not significant
A - F = 0.000 not significant
C - F = .013 not significant

RAW DATA - DEVELOPMENTAL PROFILE

TABLE IX

Group Two - 77-89 mos. Total Sample = 53 df = 2/50 Critical Value = 3.18 at 0.05 level of probability

Montessori-sample = 13					Preschool-sample = 28					Non-Preschool-sample = 12				
P	SH	S	A	C	P	SH	S	A	C	P	SH	S	A	C
98	78	84	88	96	102	90	96	78	102	98	90	84	86	102
98	98	84	92	110	106	86	84	82	102	100	94	96	86	110
110	102	102	92	110	106	114	100	88	110	106	94	96	86	102
102	90	90	86	110	92	70	86	78	106	102	98	86	86	102
98	102	90	86	114	110	110	104	90	106	78	102	102	86	102
84	82	86	78	102	102	102	104	88	102	110	94	90	86	98
90	98	104	86	100	102	98	90	86	98	114	102	100	86	106
92	82	86	82	102	106	90	86	86	90	74	94	88	86	102
106	98	80	86	102	96	102	94	86	106	102	94	90	86	102
96	78	106	86	102	106	98	90	92	106	110	82	94	86	106
110	110	100	86	102	114	110	90	86	110	106	98	78	86	102
96	94	84	86	102	96	86	80	86	110	110	106	100	86	110
100	102	98	86	114	98	102	86	86	88					
					88	102	88	86	94					
					110	106	96	86	110					
					106	92	96	82	106					
					88	90	80	86	98					
					82	94	100	86	102					
					96	90	100	86	100					
					106	98	104	92	106					
					114	102	100	92	114					
					92	98	104	92	102					
					86	86	80	86	98					
					102	90	90	86	96					
					98	96	80	86	98					
					94	102	96	82	104					
					110	86	84	92	110					
					106	102	106	86	106					
[illegible]	[illegible]	1190	1120	1510	2760	2802	2552	2410	2884	1210	1148	1104	1032	1244

P - F = .177 not significant
SH- F = .323 not significant
S - F = .020 not significant
A - F = .043 not significant
C - F = 1.222 not significant

RAW DATA - DEVELOPMENTAL PROFILE

TABLE X

Group Three - 90-102 mos. Total Sample = 47 df = 2/44 Critical Value = 3.21 at 0.05 level of probability

Montessori-sample = 16					Preschool-sample = 22					Non-Preschool-sample = 9				
P	SH	S	A	C	P	SH	S	A	C	P	SH	S	A	C
114	98	114	86	114	114	114	108	114	114	114	102	100	108	110
92	92	96	92	110	120	106	114	114	114	110	102	94	96	114
110	78	74	82	104	110	106	90	90	104	106	98	102	90	106
110	98	100	96	106	98	82	94	90	110	108	106	98	90	102
110	98	90	90	106	86	98	106	90	100	110	98	98	90	106
102	98	92	102	114	114	98	96	90	110	110	114	94	102	106
110	90	86	92	102	102	102	100	90	110	106	102	94	102	106
102	106	110	90	114	102	98	98	96	114	114	114	110	108	106
106	114	94	102	110	110	106	100	102	110	110	110	104	102	114
110	106	94	96	106	114	110	98	96	106					
110	114	108	108	110	102	110	92	90	110					
110	110	102	90	110	114	102	108	90	106					
92	114	108	96	114	106	86	82	90	114					
108	106	110	114	114	90	82	92	90	98					
110	98	100	114	114	98	110	110	102	106					
102	98	104	102	110	110	114	110	92	110					
					110	106	110	90	110					
					110	106	108	96	110					
					110	98	102	90	102					
					110	114	114	114	114					
					110	102	110	102	114					
					108	110	110	102	110					
1698	1618	1582	1552	1758	2338	2260	2256	2120	2396	988	946	894	888	970

P - F = 1.054 not significant
SH- F = .423 not significant
S - F = .894 not significant
A - F = .227 not significant
C - F = .679 not significant

RAW DATA - DEVELOPMENTAL PROFILE

TABLE XI

Group Four - 103-115 mos. Total Sample = 45 df = 2/42 Critical Value = 3.22 at 0.05 level of probability

Montessori-sample = 11					Preschool-sample = 21					Non-Preschool-sample = 13				
P	SH	S	A	C	P	SH	S	A	C	P	SH	S	A	C
114	110	110	114	114	110	114	114	114	114	114	114	106	114	114
110	114	106	114	114	114	110	110	114	110	114	114	106	114	114
114	106	90	114	110	110	110	114	114	110	106	110	96	108	110
114	114	114	114	114	110	110	114	114	106	114	110	102	114	114
110	110	114	114	114	98	98	110	108	114	110	114	100	114	114
106	110	104	108	110	114	106	114	114	106	110	106	100	108	114
110	106	108	114	114	110	102	108	114	110	110	114	114	108	102
114	114	110	114	114	110	110	102	108	114	114	110	100	114	110
106	110	106	114	114	110	114	106	114	106	114	106	106	114	114
114	110	106	108	110	114	110	100	114	110	106	110	104	108	110
110	114	114	114	114	106	106	114	114	114	102	102	100	108	110
					110	106	104	114	106	114	102	100	114	114
					114	114	84	108	110	114	114	108	114	110
					114	114	106	114	106					
					114	110	106	114	114					
					114	114	114	114	114					
					114	106	110	114	110					
					114	114	104	114	110					
					114	114	114	114	114					
					106	114	114	114	108					
					114	106	98	114	114					
1222	1218	1182	1242	1242	2334	2302	2260	2262	2320	1442	1426	1342	1452	1450

P - F = .013 not significant
SH- F = .275 not significant
S - F = 1.971 not significant
A - F = .197 not significant
C - F = 2.341 not significant

RAW DATA - PARENT QUESTIONNAIRES

TABLE XIII

Group One - 64 - 76 mos. Total Sample = 35 df = 2/32 Critical Value = 3.30 at 0.05 level of probability

Montessori-sample = 13			Preschool-sample = 12			Non-preschool-sample = 10		
S	MS	A	S	MS	A	S	MS	A
69	83	65	76	67	81	81	92	93
57	75	67	81	83	80	78	83	90
63	67	71	81	92	83	72	67	78
72	83	92	72	75	76	83	75	80
87	75	87	74	75	83	89	92	86
88	92	91	83	83	80	69	92	100
78	83	81	89	92	97	83	42	89
85	75	90	91	100	97	94	92	100
87	50	97	94	83	73	76	50	69
81	92	91	81	92	72	61	83	81
85	75	87	89	100	85			
73	67	81	67	83	77			
91	58	75						
1016	975	1065	978	1025	984	786	768	866

S - F = .433 not significant
MS- F = 2.001 not significant
A - F = .880 not significant

TABLE XVII

Group Five - 116 - 128 mos. Total Sample = 19 df = 2/16 Critical Value =3.63 at 0.05 level of probability

Montessori-sample = 6			Preschool-sample = 8			Non-Preschool-sample = 5		
S	MS	A	S	MS	A	S	MS	A
87	100	85	80	92	87	78	100	78
83	100	85	72	67	70	91	92	91
74	100	100	52	92	70	83	100	81
83	67	89	67	92	98	87	100	98
72	92	69	76	83	80	59	92	67
50	100	83	52	58	81			
			81	100	80			
			65	75	93			
449	559	511	545	659	659	398	484	415

S - F = 1.396 not significant
MS -F = 2.486 not significant
A - F = .126 not significant

RAW DATA - PARENT QUESTIONNAIRES

TABLE XIV

Group Two- 77-89 mos. Total Sample = 52 df = 2/49 Critical Value = 3.185 at 0.05 level of probability

Montessori-sample = 12			Preschool-sample = 28			Non-Preschool-sample = 12		
S	MS	A	S	MS	A	S	MS	A
61	42	67	70	67	72	65	83	69
96	92	94	72	75	93	76	67	67
54	42	69	96	100	94	78	92	74
78	100	87	61	92	79	87	100	97
63	58	69	74	75	90	80	58	94
78	83	85	76	67	83	72	92	69
61	25	56	87	50	93	78	92	83
72	100	97	70	83	87	61	83	72
80	100	80	78	100	81	78	67	79
87	100	89	70	92	81	78	67	94
80	83	79	63	50	57	93	100	84
81	75	77	80	83	78	59	50	71
			80	83	81			
			83	92	85			
			83	83	97			
			83	67	88			
			72	83	81			
			78	92	79			
			89	92	83			
			89	83	85			
			91	92	90			
			83	67	73			
			67	67	79			
			96	75	76			
			41	58	61			
			87	83	81			
			96	100	93			
			69	67	93			
891	900	949	2184	2218	2313	905	951	953

S - F = .498 not significant
MS- F = .245 not significant
A - F = .676 not significant

RAW DATA - PARENT QUESTIONNAIRES

TABLE XV

Group Three - 90-102 mos. Total Sample = 47 df = 2/44 Critical Value = 3.21 at 0.05 level of probability

Montessori-sample = 16			Preschool-sample = 22			Non-preschool-sample = 9		
S	MS	A	S	MS	A	S	MS	A
85	67	83	67	58	81	72	83	74
74	92	80	76	100	100	65	100	96
81	100	93	67	75	87	69	100	77
69	75	89	87	100	98	74	92	72
87	100	100	72	92	88	76	75	86
98	92	100	78	92	98	55	83	78
85	92	74	83	83	83	74	83	80
72	92	81	91	75	93	69	92	91
74	100	88	61	100	100	74	100	80
68	100	88	80	83	92			
98	92	98	63	100	100			
76	92	80	85	100	100			
78	83	83	74	83	81			
78	92	81	63	100	85			
76	83	83	89	100	80			
87	100	92	96	75	81			
			96	75	83			
			70	100	100			
			69	92	87			
			78	83	78			
			89	100	83			
			72	58	74			
1286	1452	1393	1706	1924	1952	628	808	734

S - F = 3.614 significant
MS- F = .395 not significant
A - F = 2.456 not significant

T Test on Significant Difference - Group Three - Social

$\bar{X}_1 = 80.375 \quad \bar{X}_3 = 69.778, \; n_1 = 16 \quad n_3 = 9, \; \hat{S}^2_w = 91.062$

$$t = \frac{80.375 - 69.778}{\sqrt{91.06\ (1/16 + 1/9)}} = \frac{10.597}{3.976} = 2.66, \quad df = 44$$

$\bar{X}_2 = 77.545 \quad \bar{X}_3 = 69.778, \; n_2 = 22 \quad n_3 = 9, \; \hat{S}^2_w = 91.062$

$$t = \frac{77.545 - 69.778}{\sqrt{91.06\ (1/22 + 1/9)}} = \frac{7.767}{3.975} = 2.05, \quad df = 44$$

RAW DATA - PARENT QUESTIONNAIRES

TABLE XVI

Group Four - 103-115 mos. - Total Sample = 45 df = 2/42 Critical Value = 3.22 at 0.05 level of probability

Montessori-sample = 11			Preschool-sample = 21			Non-Preschool-sample = 13		
S	MS	A	S	MS	A	S	MS	A
87	100	98	74	75	91	76	100	85
87	100	85	83	92	89	80	100	76
83	100	88	85	100	81	70	100	83
80	92	80	91	100	85	83	100	81
80	100	91	70	100	81	78	100	85
85	92	78	83	83	80	85	100	100
74	100	91	80	92	83	74	75	80
80	100	96	69	83	89	76	100	100
69	100	100	74	100	67	94	42	91
91	58	83	80	83	78	81	83	96
83	100	100	87	83	98	70	92	70
			74	83	83	69	92	91
			87	100	91	81	92	100
			57	67	74			
			72	58	93			
			69	83	80			
			69	92	96			
			78	92	74			
			78	92	86			
			83	75	93			
			87	100	98			
899	1042	990	1630	1833	1790	1017	1176	1138

S - F = 1.145 not significant
MS- F = 1.109 not significant
A - F = 1.117 not significant

RAW DATA - TEACHER QUESTIONNAIRES

TABLE XVIII

Group One - 64-76 mos. Total Sample = 23 df = 2/20 Critical Value = 3.49 at 0.05 level of probability

Montessori -sample = 12			Preschool-sample = 6			Non-preschool-sample = 5		
S	MS	A	S	MS	A	S	MS	A
59	75	70	69	67	75	89	100	93
72	100	67	83	100	83	70	75	91
46	17	57	65	83	71	88	75	80
91	100	100	76	75	83	81	92	83
96	100	97	91	100	97	81	100	53
67	100	67	83	83	83			
93	92	100						
80	58	80						
85	75	79						
91	75	87						
77	100	63						
96	100	100						
953	992	967	487	508	492	409	442	400

S - F = .075 not significant
MS- F = .137 not significant
A - F = .028 not significant

TABLE XIX

Group Two - 77-89 mos. Total Sample = 28 df = 2/25 Critical Value = 3.38 at 0.05 level of probability

Montessori-sample = 10			Preschool-sample = 13			Non-Preschool-sample = 5		
S	MS	A	S	MS	A	S	MS	A
61	100	76	56	50	70	57	75	72
80	100	65	83	100	78	87	92	69
81	100	83	89	92	93	87	83	83
70	17	60	81	83	67	98	100	98
74	100	83	96	100	78	46	67	65
61	75	64	85	92	74			
91	100	100	85	100	85			
83	100	100	70	42	67			
87	92	95	72	75	78			
98	100	98	60	17	57			
			48	33	43			
			85	83	85			
			81	92	97			
786	884	824	991	959	972	375	417	387

S - F = .115 not significant
MS- F = .943 not significant
A - F = .759 not significant

RAW DATA - TEACHER QUESTIONNAIRES

TABLE XX

Group Three - 90-102 mos. Total Sample = 33 df = 2/30 Critical Value = 3.32 at 0.05 level of probability

Montessori-sample = 14			Preschool-sample = 14			Non-Preschool-sample = 5		
S	MS	A	S	MS	A	S	MS	A
83	92	94	81	83	72	61	100	64
88	100	94	78	100	89	87	100	85
87	92	78	85	100	94	57	100	78
89	100	93	78	100	93	56	17	72
96	100	89	91	67	86	33	17	61
54	42	67	85	100	78			
67	100	83	83	92	93			
83	58	78	87	100	98			
83	92	80	85	83	94			
85	100	100	94	100	93			
72	100	67	78	75	88			
85	50	85	94	100	94			
89	100	86	56	92	63			
96	100	98	63	100	87			
1157	1226	1192	1138	1292	1222	294	334	360

S - F = 7.38 Significant
MS- F = 2.345not significant
A - F = 4.353 Significant

T Test on Significant Difference - Group Three - Social

$\bar{X}_1 = 82.6 \quad \bar{X}_3 = 58.8, \quad n_1 = 14 \quad n_3 = 5, \quad \hat{S}^2_w = 155.095$

$$t = \frac{82.6 - 58.8}{\sqrt{155.095\ (1/14 + 1/5)}} = \frac{23.8}{6.488} = 3.66, \text{ df} = 30$$

$\bar{X}_2 = 81.3 \quad \bar{X}_3 = 58.8, \quad n_2 = 14 \quad n_3 = 5, \quad \hat{S}^2_w = 155.095$

$$t = \frac{81.3 - 58.8}{\sqrt{155.095\ (1/14 + 1/5)}} = \frac{22.5}{6.488} = 3.46, \text{ df} = 30$$

T Test on Significant Difference - Group Three - Academic

$\bar{X}_1 = 85.1 \quad \bar{X}_3 = 72.0, \quad n_1 = 14 \quad n_3 = 5, \quad \hat{S}^2_w = 102.15$

$$t = \frac{85.1 - 72.0}{\sqrt{102.15\ (1/14 + 1/5)}} = \frac{13.1}{5.265} = 2.488, \text{ df} = 30$$

$\bar{X}_2 = 87.3 \quad \bar{X}_3 = 72.0, \quad n_2 = 14 \quad n_3 = 5, \quad \hat{S}^2_w = 102.15$

$$t = \frac{87.3 - 72.0}{\sqrt{102.15\ (1/14 + 1/5)}} = \frac{15.3}{5.265} = 2.905$$

RAW DATA - TEACHER QUESTIONNAIRES

TABLE XXI

Group Four - 103-115 mos. Total Sample = 27 df = 2/24 Critical Value = 3.40 at 0.05 level of probability

Montessori-sample = 6			Preschool-sample = 15			Non-Preschool-sample = 6		
S	MS	A	S	MS	A	S	MS	A
74	92	83	67	75	85	83	100	88
91	100	94	72	92	78	80	100	91
96	100	98	98	100	78	94	100	98
81	92	100	74	92	76	78	92	88
81	92	74	93	100	80	87	100	100
87	100	100	59	92	80	80	100	89
			81	83	74			
			61	100	74			
			83	100	91			
			65	75	61			
			72	100	83			
			43	75	61			
			85	92	89			
			63	100	94			
			48	50	63			
510	576	549	1064	1326	1167	502	592	554

S - F = 3.769 Significant
MS- F = 2.177 not significant
A - F = 7.327 Significant

T Test on Signficant Difference - Group Four - Social

$\bar{X}_1 = 85 \quad \bar{X}_2 = 70.9, \quad n_1 = 6 \quad n_2 = 15, \quad \hat{S}^2_w = 159.51$

$$t = \frac{85 - 70.9}{\sqrt{159.51\ (1/6 + 1/15)}} = \frac{14.1}{6.10} = 2.311, \quad df = 24$$

$\bar{X}_2 = 70.9 \quad \bar{X}_3 = 83.7, \quad n_2 = 15 \quad n_3 = 6, \quad \hat{S}^2_w = 159.51$

$$t = \frac{83.7 - 70.9}{\sqrt{159.51\ (1/15 + 1/6)}} = \frac{12.8}{6.10} = 2.098, \quad df = 24$$

T Test on Significant Difference - Group Four - Academic

$\bar{X}_1 = 91.5 \quad \bar{X}_2 = 77.8, \quad n_1 = 6 \quad n_2 = 15, \quad \hat{S}^2_w = 90.80$

$$t = \frac{91.5 - 77.8}{\sqrt{90.80\ (1/6 + 1/15)}} = \frac{13.7}{4.60} = 2.99, \quad df = 24$$

$\bar{X}_2 = 77.8 \quad \bar{X}_3 = 92.3, \quad n_2 = 15 \quad n_3 = 6, \quad \hat{S}^2_w = 90.80$

$$t = \frac{92.3 - 77.8}{\sqrt{90.80\ (1/15 + 1/6)}} = \frac{14.5}{4.60} = 3.15, \quad df = 24$$

RAW DATA - TEACHER QUESTIONNAIRES

TABLE XXII

Group Five - 116 - 128 mos. Total Sample = 12 df = 2/9 Critical Value = 4.26 at 0.05 level of probability

Montessori-sample = 5			Preschool-sample = 5			Non-Preschool-sample = 2		
S	MS	A	S	MS	A	S	MS	A
85	92	94	80	92	96	100	100	80
89	100	93	93	92	83	63	75	65
56	75	61	80	75	67			
81	100	81	93	100	67			
56	67	76	59	75	87			
367	434	405	405	434	400	163	175	145

S - F = .315 not significant
MS- F = .002 not significant
A - F = .327 not significant

EQUATION FOR DETERMINING ANALYSIS OF VARIANCE* TABLE XXIII

Key: X_1 = total of M scores X_1^2 = total of squares of M scores

X_2 = total of P scores X_2^2 = total of squares of P scores

X_3 = total of NP scores X_3^2 = total of squares of NP scores

n1 = total M sample in group N = total sample in group

n2 = total P sample in group k = total divisions in group (M,P,NP)

n3 = total NP sample in group df = degrees of freedom

1. $\sum X_{tot} = X_1 + X_2 + X_3$

2. $\sum X_{tot}^2 = X_1^2 + X_2^2 + X_3^2$

3. $\sum x_{tot}^2 = X_{tot}^2 - \frac{(X_{tot})^2}{N}$

4. $\sum x_B^2 = \left[\frac{(X_1)^2}{n1} + \frac{(X_2)^2}{n2} + \frac{(X_3)^2}{n3}\right] - \frac{X_{tot}^2}{N}$

5. $\sum x_W^2 = \left[X_1^2 - \frac{(X_1)^2}{n1}\right] + \left[X_2^2 - \frac{(X_2)^2}{n2}\right] + \left[X_3^2 - \frac{(X_3)^2}{n3}\right]$

6. Proof: within-group sum squares may be obtained by subtraction, ie:

$$\sum x_W^2 = \sum x_{tot}^2 - \sum x_B^2$$

7. Between group variance estimate is:

$df_B = k - 1, \quad \hat{S}_B^2 = \frac{x_B^2}{df_B}$

8. Within-group variance estimate is:

$df_W = N - k, \quad \hat{S}_W^2 = \frac{x_W^2}{df_W}$

9. Value of F is:

$F = \frac{\hat{S}_B^2}{\hat{S}_W^2} \quad df = \frac{df_B}{df_W}$

*Haber & Runyon, General Statistics, (Reading, Mass., Addison-Wesley Publishing Co, 1969) p. 229

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